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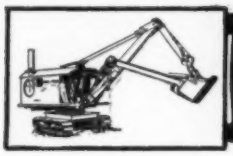
The EXCAVATING ENGINEER

Vol. XV No. 10 OCTOBER, 1921



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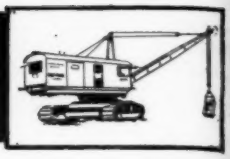

104 FIFTY-TON ORE CARS IN TEN HOURS

Is the Record Set by this Bucyrus 88-C Shovel Digging and Loading Iron Ore

Since 1917 this shovel has been in service, removing boulder surface, digging rock and very hard iron ore. It has given excellent service continuously since it was put on this job. And it has been maintained with a minimum of repair expense.

Bucyrus Shovels Will Work with the Same Efficiency for You

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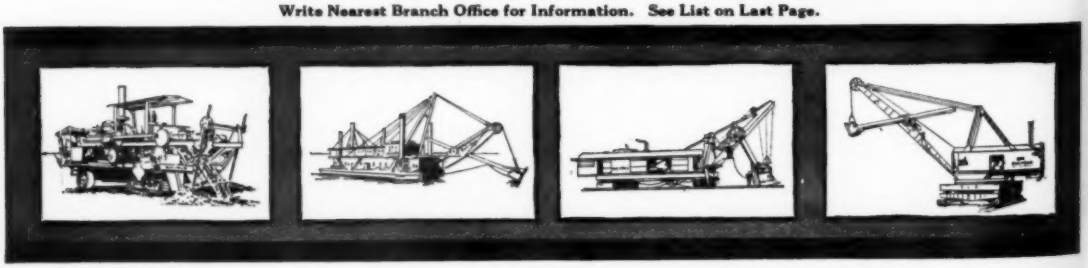
South Milwaukee, Wisconsin

Write Nearest Branch Office for Information. See List on Last Page.



Western Dump Wagons in Road Work

Western

that's why

Modern road revision and grade reduction frequently require steam shovel excavating and dump-wagon hauling. If you are not familiar with Western wagons, work a few with your others on your next contract and note the difference.

Contractors tell us that the only wagon to use with a steam shovel is the Western — other makes may seem all right for a short time but they can't stand the pounding. You cannot overwork a Western — they are on the job every day and every minute.

The picture shows a Western wagon under a 14-B Bucyrus in some Michigan road work. It would stand up under a larger dipper, just the same.

Our new catalog on Contractor's Equipment, No. E-52, is just off the press. *Send for a copy.*

Western Wheeled Scraper Company

Earth and Stone Handling Equipment

Aurora, Illinois

For convenience in making inquiry use postal inserted in this number.

Bucyrus Class-72 Trench Excavator Digging a 5-foot Trench, Twenty-one Feet Deep at the Rate of a Foot a Minute.

Looking down the trench towards the Bucyrus. Note how the independent conveyor engine with which this machine is equipped makes it possible to pile the spoil at a safe distance from the trench.

The Excavating Engineer

Vol. 15 OCTOBER 1921 No. 10

Digging 36 Miles of Sewer Trench

C. R. Nichols of Wichita Falls, Texas, Has Recently Finished a Large Contract for That City, Using Four Trench Excavators

THIRTY-SIX miles of sewer excavation for various sizes of sewer mains from six inches up to thirty-nine inches means a big job, one that requires for its successful completion, up-to-date machinery and methods, and first-class management.

This is the size of the job recently completed for the city of Wichita Falls, Texas, by C. R. Nichols, a prominent contractor of that city. The contract price was $750,000 calling for 36 miles of sewer trench with a maximum depth of 22 feet. This is the most extensive sewer work ever undertaken by the City of Wichita Falls, and largest single contract let in the South West.

Mr. Nichols is well equipped to handle a job of this size, as he has been in the contracting business for over eleven years, and has specialized in sewer, water works, and paving jobs.

What the Job Includes

The trench for the main trunk line of the sewer is 7 to 22 feet deep, 5 feet wide. The sewer itself is 39 inches in diameter, built up of vitrified segment blocks. Two diversions intercept the main trunk line, to relieve the main part of town from congestion and 6-inch lines run from the main trunk lines through alleys. There are nine sizes of sewer mains from 39-inch main trunk lines to 6-inch laterals, and as stated above the total length of sewers built was over 36 miles. The contract includes building the entire length of sewer mains as well as the excavation and back filling.

How the Excavation is Handled

The excavation for this contract was done by four trench excavators, a Bucyrus Class-72 doing the heaviest work, the remainder being done by two Buckeye trench excavators and one Austin excavator. These machines excavated the different parts of the job as follows:

Trench for 39-inch main, 6,800 feet—Bucyrus
Trench for 36-inch main, 6,000 feet—Bucyrus
Trench for 33-inch main, 4,000 feet—Bucyrus
Trench for 30-inch main, 4,000 feet—Bucyrus
Trench for 24-inch main, 8,000 feet—Buckeye

Digging a five-foot trench for the 39-inch sewer main. Tile for constructing the sewer main in the foreground.

Trench for 18-inch main, 11,000 feet—Austin
Trench for 15-inch main, 14,000 feet—Buckeye
Trench for 12-inch main, 7,600 feet—Buckeye
Trench, smaller mains, 100,000 feet—Buckeye

The material is for the most part hard red clay with some quicksand. Some very good outputs have been made on this work. During the period from November 23, 1920 to February 14, 1921 the total excavation amounted to 19,581 cu. yds. The total machine cost for this excavation, exclusive of repairs and depreciation was $3,719.90, including labor and fuel costs. This low cost per cubic yard shows how efficiently the job was handled.

All sections of the trench over 10 feet in depth were braced with 2 x 12 pine planks. The walling strips were spaced on five-foot centers.

The center of the spoil pile was 12 to 18 feet from the edge of the trench. Three Austin backfillers, one Buckeye backfiller, one Cletrac tractor, and one Holt tractor were used for backfilling.

Building the Segment Block Sewer

The segment tile of the sewer main was laid behind the trench excavator as fast as the trench was dug. The method of building the sewer is interesting. The trench was first rounded out to fit the side of the finished pipe. One row of segment blocks was then laid in the center of the ditch and tamped to

grade. This is known as the flow block. A row of blocks was then laid on each side and tamped to their proper place. Other rows of blocks were then laid till the sewer was completed to the spring line. The blocks for the upper half of the sewer were laid on a form 12 feet long. As soon as the arch was completed the form was collapsed and moved ahead for another section.

Mr. Nichols has owned eight trench excavators of different makes during the time he has been in the contracting business, and has operated under lease or rental, twelve machines. In regard to the Bucyrus trench excavator Mr. Nichols says: "I am exceedingly well pleased with the work performed by the Bucyrus and think it the best machine I have ever operated for heavy work."

The speed of operation of this machine, as timed on the Wichita Falls job, is 61½ feet of completed trench, 5 feet wide by 21 feet deep, in 60 minutes of continuous operation. This Bucyrus trench excavator has made an output of 333 cubic yards per hour, digging in hard clay.

The Bucyrus trench excavator is equipped with an independent conveyor engine. This makes it possible for the operator to regulate the distance from the trench to the center of the spoil pile. Mr. Nichols states that this is the biggest improvement he has found on a trench excavator in years, as it allows the spoil to be kept far enough away from the trench to prevent caving.

Moving Over a Low Spot

This machine is equipped with a 20-foot ladder which will carry buckets from 24 to 72 inches wide. However, none smaller than 48 inches were used on this job.

From 50 to 150 men were employed at different times on this job. Mr. C. R. Nichols was directly in charge, assisted by R. C. Nelson, Chief Engineer; Clyde C. Key, Office Engineer; W. A. McRae, Superintendent; W. L. Robb, Supt.; J. L. Poole, Master Mechanic; and Tony Anderson, George Lewis, T. R. Lester and W. E. Mayer, Foremen.

Logging Road Excavation in Texas

Description of Revolving Shovel Operations of the C. L. Flournoy Company for the Kirby Lumber Company in Eastern Texas

FOR about 180 miles, as the crow flies, from Shelby county to the Gulf of Mexico, the Sabine River forms the boundary between the states of Texas and Louisiana and just west of this line in an area covered by ten counties, the extreme dimensions of which are roughly 160 miles in depth by 100 miles in width, the Kirby Lumber Company of Houston, Texas, has under lease, approximately 800,000 acres of pine and hard wood timber land.

In this immense area this Company is operating eleven saw mills, each of which has its own logging camp with an average of ten miles of logging road each. The two largest mills at Bessmay and Call in Jasper County are logged from the Blox Logging Camp, perhaps the largest in this part of the South. In addition to this Liberty, Angelina, Tyler, Hardin, Newton, Jasper, Sabine, San Augustine, Shelby and Polk Counties are tapped from mills at Browndell in Jasper County, Silsbee and Village Mills in Hardin County and Beaumont in Jefferson County, the whole area being served by the Santa Fe and the Texas and New Orleans Railroad.

The Kirby Lumber Company has in operation a total of about 100 miles of logging railroad and at the present time has contemplated or in course of construction seventeen additional miles of line involving the excavation of about 500,000 cubic yards of material.

This construction has all been done by The C. L. Flournoy Company of Jasper, Texas. The work first started in July 1916 and up to a million cubic yards have been handled since this time.

Steam Shovel Operation Replaces Team Work

The topography of the country is very varied in character, ranging from lowland to very hilly, broken and rocky country, particularly in Jasper, Newton, Angelina, Sabine and San Augustine Counties. Early in 1920 the character of the excavation became so heavy that Mr. Flournoy determined upon other means of operation and purchased a 14-B Bucyrus revolving shovel mounted on caterpillar traction. Previous to this drag scrapers, wheel scrapers and fresnos were used. The economy of steam shovel operation was soon manifest. As Mr. Flournoy puts it: "I

found it was much easier and there was a great labor saving, after installing my 14-B with wagons."

So successful was the operation of this first shovel that early in February 1921 he installed a new 30-B Bucyrus revolving shovel similarly mounted.

The 14-B alone has moved over 100,000 cu. yds. of material of all kinds from gumbo and gravel to solid rock, packed sand and hard-pan. Both shovels have been in very heavy work on cuts, at times running up to 27 ft. in depth through hard-pan and rock. The work has been for the most part through a pine forest. The shovels dug out the stumps without the use of powder when the cuts were sufficiently deep. Dynamite was used only on the extra large stumps.

As may be seen from our views, wood is being used as fuel in ordinary coal burning boilers with the same grates, with good results. This appears to be the usual practice in the pine forests of this country.

The shovels have been served by 1½-yd. Western dump wagons, the number in attendance depending upon the length of haul.

Mr. Flournoy states that the shovels have proved a great satisfaction and have greatly simplified operations. He states emphatically that the caterpillar mounting has proved valuable for this type of service, the shovel moving from place to place with no trouble at all.

Mr. C. L. Flournoy is in charge of the work with E. Willis as steam shovel foreman. Work is held up at the present time by the condition of the lumber market, but resumption is expected in the near future.

C. L. Flournoy's 14-B Bucyrus shovel going through a heavy cut in logging road construction in eastern Texas. "Is a great labor saver," says Mr. Flournoy, "makes all dirt one class."

C. L. Flournoy's 30-B Bucyrus shovel excavating for a logging road through a pine forest in eastern Texas. Note that wood is being used as fuel

Coal Stripping in Alabama

Operations of D. B. Gore Company, Inc., in the Southern Soft Coal Fields

AT Tait's Gap, Alabama, is located the coal stripping property of the D. B. Gore Company, who are among the largest and best known coal operators of the South. Many unusual features of operation are included in their plant, and a short description of their open pit mine and equipment will no doubt be of interest.

Description of the Property

The property consists of about 200 acres located on the L. & N. Railroad at Tait's Gap, Blount County, Alabama. The surface of the land is rolling, located in a valley between two mountains. The coal is above drainage level, but some uneven places are drained by a small steam operated pump.

The coal vein averages twenty-eight inches in thickness, and is covered with about thirty feet of overburden. The coal is soft bituminous, and is a high-grade steam, gas or coke coal.

Between the mine and the railroad is a hill, rising about 200 feet above the L. & N. tracks. All coal must be hauled from the mine over the mountain to the tipple on the railroad. This is done by a steam hoist located on top of the mountain. The incline on the mine side is about 1500 feet long with an elevation of 130 feet, and on the railroad side the incline is about the same length with a drop of 200 feet.

Landing the main machinery of the 225-B on top of the mountain after hauling it up the 60% grade from the railroad. The track is 36-inch gauge.

The hoist is operated so that when a car is coming up the incline on the mine side of the mountain a loaded car is going down the incline to the tipple, and when an empty car is going down the mine incline, an empty car is coming up from the tipple.

Excavation

The stripping is handled by a Bucyrus 225-B revolving shovel, equipped with an 85-foot boom, 5-yard dipper and 60-foot dipper sticks. The coal is dug and loaded by a Bucyrus 18-B caterpillar

The 85-foot Boom of the 225-B Bucyrus Shovel Ready to Be Hauled Up the Incline over the Mountain to the Mine

mounted revolving shovel equipped with a 1½-yard dipper.

The shovels started work on June 20, 1917. The parts of the large shovel were hauled over the mountain on the car incline, and erected at the mine location. The 18-B was erected at the railroad and made the trip over the mountain to the mine under its own power.

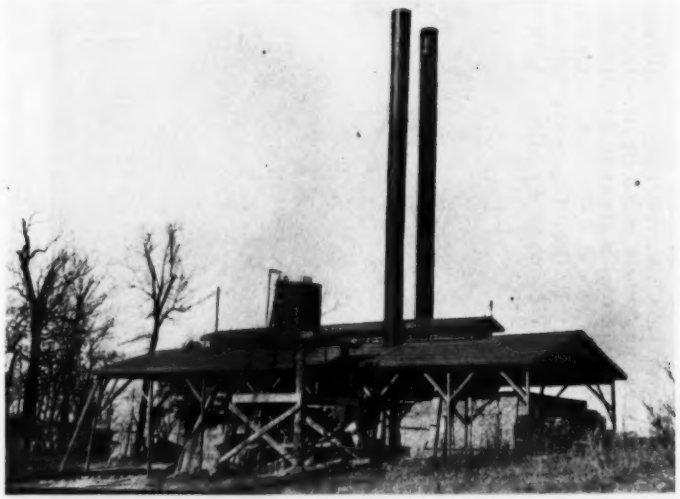
The overburden, averaging 30 feet deep, consists of sand, rock, boulders, slate and shale. It is blasted before being handled by the 225-B. A well driller is used for sinking the holes, which are spaced on 30-foot centers. One to 10 kegs of black powder are used in each hole. The holes are shot by electricity.

The stripping was started on an out-crop and the overburden is side cast. There is no box cut. The cuts are about 65 feet wide and the overburden is spoiled in the previous cut from which the coal has been removed. The cuts run north and south.

Two eight-hour shifts are worked on stripping, the first crew coming on at 6 A.M. and working till 2 P.M. the second shift working from 3 to 11

Looking Down the Incline Towards the Mine from the Top of Raccoon Mountain

The Bucyrus 18-B getting a dipperful of coal. The special 3-yard cars may be seen in the background.



The hoist to the top of the mountain which pulls the cars over the incline from the mine. The mountain is located between the mine and the tipple.

The Bucyrus 225-B ready to dump 5 yards of overburden. The machine is here digging in an outcrop where no box cut is necessary.

Four Views of the D. B. Gore Company's Coal Stripping Operations Near Tait's Gap, Alabama

P.M. The average output of the 225-B is 1800 yards per shift.

The Bucyrus 18-B shovel follows the 225-B in loading the coal. The loading tracks are laid on top of the coal, and the shovel is on the fire clay beneath the coal.

The coal vein is about 28 inches in thickness. The top of the coal is fairly level, pitching slightly to the center of the property from all sides.

The coal is shaken with "Coalite 2-D" powder placed in holes on about 8-foot centers. These holes are also shot electrically. A loading shift is 10 hours long and as high as 400 tons per shift have been loaded. The coal lies evenly and is solid, as there are no partings or "horse-backs" in the coal.

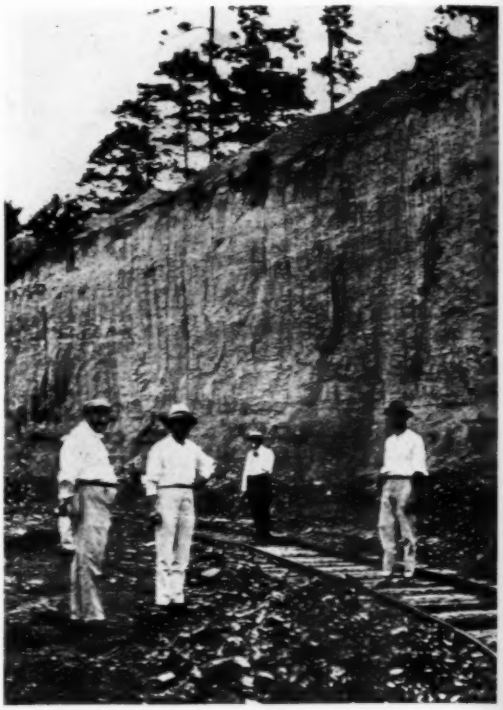
Water for both machines is pumped from a natural basin to a 10,000 gallon tank on top of the mountain. From this tank it runs by gravity to the pit. Coal is of course loaded on the machines from the pit whenever needed.

Other Equipment on the Job

The coal is loaded into 3-ton cars, which were made by the D. B. Gore Company. Thirty of these cars are used. The haul from the mine to the foot of the incline over the mountain is about two miles, and one 18-ton Porter locomotive is used. From the foot of the incline to the tipple, a distance of about 3000 feet, the cars are handled by the hoist at the top of the mountain.

At the tipple the cars are dumped into a bin of 75 tons capacity, and from this bin the coal is chuted direct into railroad cars. All coal shipped is mine run, as there are no screens in the tipple. The average annual output of coal is about 40,000 tons.

The main offices of the D. B. Gore Company, Inc., are located at 1016 Woodward Building, Birmingham. The coal mining operations are under the management of Mr. D. B. Gore. Mr. Grover George is superintendent and Dave Clevenger is pit foreman. J. T. Bruce and Harry Nunez are engineers on the Bucyrus 225-B and G. F. Pearman pulls the levers on the 18-B digging the coal.



"Grand Canyon" in the deepest part of the cut. Note the teeth marks on the bank, showing the toughness of the digging.

D. B. Gore Company's Bucyrus 225-B stripping 30 feet of overburden. This view shows clearly the character of the overburden which is very tough shale and sand rock.

Putting It Up to the Hog Rods

A Remarkable Cave-in Under a Shovel on J. Robert Bazley's Contract Near Shenandoah, Pennsylvania

IT is not uncommon in the anthracite district of Pennsylvania to experience sudden and unexpected cave-ins, more or less serious, due to old workings being weakened by rains or shaken by operations overhead. However, J. Robert Bazley, a prominent stripping contractor of Pottsville, Pennsylvania, has sent us a description of one of such cave-ins which in many respects was remarkable.

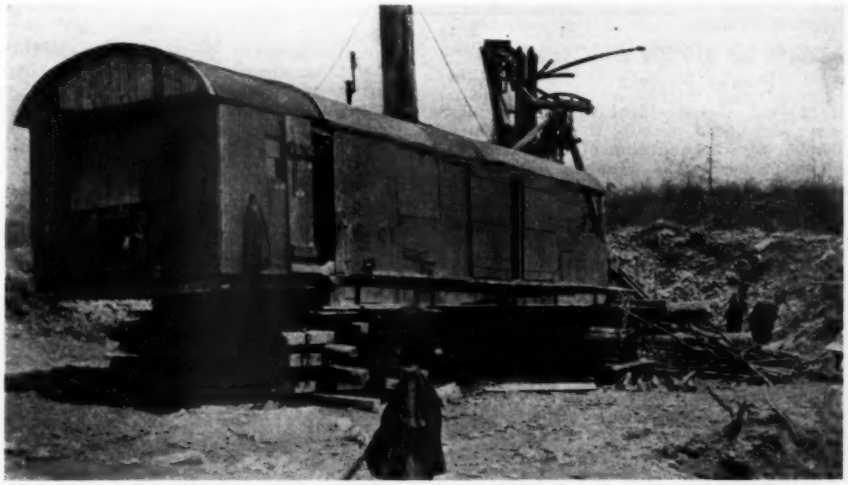
It happened in May 1919. Mr. Bazley was then engaged on his first year of a stripping contract with the East Bear Ridge Colliery Company of Mahanoy Plane, Pa., on which he is still busy.

One of his 70-Ton Bucyrus shovels was at work stripping over the Mammoth Vein near Shenandoah. During the night in question heavy rains occurred which caused the weakening of old underground workings beneath the spot where the shovel was digging. About 5:30 A. M. without warning, the ground gave way, leaving a gaping cave, extending from the front wheels of the rear trucks to near the point where the dipper rested on the ground and extending from jack to jack. Even the right hand jack was undermined due to the pitch of the vein, and later in the day, after cribbing had been placed, ground gave way under the front wheels of the rear truck. This left the shovel suspended between the rear trucks and the dipper.

Solid Anthracite Stripped by a 70-ton Bucyrus

One of our views shows the only resulting damage to the shovel, a slight bending of the hog rods. When it is realized how tremendous was the strain transmitted at this point, it is indeed remarkable, to quote from Mr. Bazley's letter, "that it was not their undoing." But they held.

It took about four hours to make things safe. Rails and mine timber was used for cribbing as shown in our views. A "battery" or timber dam



After the cribbing was put in. Note the position of the hog rods. The total weight of the shovel was supported on these rods and the rear truck until the cribbing was placed.

[East Bear Ridge Mammoth Vein Stripping Near Shenandoah

was put between two pillars of coal below and the breach filled up with clay, rock, trunks of trees, etc., until a road was built under the shovel. Then they continued digging. Two days after moving off, the breach opened up again. Mr. Bazley has been operating two 70-Ton Bucyrus shovels on his stripping contract, but during the past year only one of these has been in use. He has recently started a new 78-C Bucyrus. He also is operating an Osgood 18 under lease.

The Cave Under the Bucyrus — Note the Track Suspended in Mid Air

Work Starts on $10,000,000 Canadian Power Project

A. W. McLimont, vice-president of the Winnipeg Electric Railway, announced recently that arrangements had been concluded for the financing of the $10,000,000 power development project on the Winnipeg River.

Work on the project has started and about 200 men are now employed. Later on from 1,000 to 2,500 men will be employed on the construction of the plant, which will be one of the world's largest systems for the development of electrical power. It will be completed in 1924, according to present plans.

The Great Falls plant will be constructed in six units of 28,000 H.P. each. Work was first started in 1914, and again in 1919. Owing first to the war, and later to financial conditions, work had to be suspended. A short time ago it was resumed and to date the cofferdam has been built, the site unwatered and much of the rock excavation completed.

The dam when completed will have a maximum height of 70 feet, and a total length of 3000 feet, and will create a storage reservoir of 1,935 acres, extending five miles up stream.

The development of this immense amount of electric power will mean much for Winnipeg. An industrial research department, headed by experienced electrical engineers, has already been organized and the duties of this department will be to induce power using industries to locate in Winnipeg. Mr. McLimont expressed the conviction that many new industries would locate in Winnipeg and vicinity as soon as power was available.

It seemed that when Rastus and Sam died they took different routes, so when the latter got to heaven he called Rastus on the phone.

"Rastus," he said, "how do you like it down there?"

"Oh, boy!" replied Rastus, "this sure am some place. All we have to do is to wear a red suit with horns and every now and then shovel some coal on the fire. We don't work no more dan two hours out of twenty-four down here. But tell me, Sam, how is it with you up yonder?"

"Mah goodness! We have to git up at fo' o'clock in de mawning, and gathah in de stahs; den we has to haul in de moon and hang out de sun. Den we has to roll de clouds aroun' all day long."

"But, Sam, how comes it you has ter work so hard?"

"Well, to tell you de truf, Rastus, we's kinda short of help up here."

The Excavating Engineer

A Monthly Publication Devoted to Excavating and Allied Subjects

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THE
EXCAVATING ENGINEER PUBLISHING CO.
Bradlee Van Brunt, Manager and Editor
South Milwaukee, Wisconsin

The Construction Outlook

In our last issue we published a chart based upon figures prepared by the Bureau of Labor Statistics, by Dwight P. Robinson & Company, the well-known engineers and constructors. This chart seemed to show that prices of construction material had undoubtedly become stabilized and offered the ground for the prediction that with the release of the great volume of work now held up awaiting just such a condition, these prices would undoubtedly respond to the law of supply and demand and be pushed upward.

Reports for the month of August appear to bear out this prediction, as far as the release in work is concerned. The Engineering News Record reports that for the first time this year, the total value of contracts let for August has exceeded the figure for August 1920. The figure for this year was 104,600,000 as against 92,600,000 in 1920. This does not include residential building or housing projects that are not industrial in character.

These figures will undoubtedly cause much speculation among those whose livelihood depends upon the amount of excavation that is offered. It seems to be an undebatable fact that the pickings are still few and far between for the earth movers.

It is remarkable to note that out of nine classifications only three show a decrease. Industrial building shows a drop of from 26,000,000 for 1920 to a little over 7,000,000 for 1921. Government work showed a slight decrease and excavating and dredging a decline from 4,180,000 in August 1920 to 89,140 in August 1921.

We find on the other hand that $28,700,000 of contracts have been let for streets and roads in August 1921 against $18,600,000 in 1920. Sewer work and buildings show an increase of over 50% and the figure for water works was over three times the August 1920 total.

1920 was considered a good construction year and yet conditions today are actually considered depressed despite the fact that the total for August is in excess of 1920. Is this because contractors were kept busy during 1921 on holdover highway work, or is it because the work let this year so far consists of a large number of small and comparatively inexpensive jobs, involving little excavation? If the latter be true — and the explanation seems to be a fair one — it is clear that when excavation begins to come, it will come in a flood.

Secretary Hoover evidently foresees this in urging the fall letting of highway contracts by state organizations in order to spread better the construction load which is bound to come. Furthermore, Thomas H. MacDonald, Chief of the United States Bureau of Public Roads, has predicted that 1921 will be the banner year in highway construction.

It now seems certain that the Townsend Bill, providing for Federal Aid for highway construction will become law by November first. This in itself will not only provide a tremendous impetus for road building, but will undoubtedly stimulate other types of construction work.

This bill passed the Senate on August 19, carrying an appropriation of $75,000,000. It provided that the states designate a system of roads not to exceed 7 per cent of all highways in the states. Three-sevenths of this 7 per cent must be interstate roads and the remaining four-sevenths intercounty roads, connecting with interstate roads. It further provided that not less than 60 per cent of Federal Aid funds must be expended on interstate roads. The differences between this bill as passed by the Senate and the House are not great and at this time the consensus of opinion seems to be that it will become law shortly after the convening of Congress and at least by November first.

The effect of Judge Landis' decision is still somewhat problematical at this writing, but there seems to be foundation for the expectation that this may be the means of pulling the stopper that has been holding back that immense volume of construction work which has been promised us for so long. Conditions are certainly depressed now for the earth mover but "the darkest hour of the night is that before the morning light."

The Complete Laborer

A stranger strolled into the office of a small-town paper.

I wonder if you could put me in touch with the writer of this ad?" he said, handing the clerk a clipping which read:

"Young man, industrious, reliable, wants work as chauffeur, cook, stenographer, painter, carpenter, clerk, night watchman, steamfitter, handy man or laborer. P. O. Box 13."

"Got a job for him?"

"No, but I'm a stranger in this burg and I want to meet up with an ex-Army man."

—*The American Legion Weekly.*

· FIELD NOTES ·

Maintenance and Upkeep of Motors on Electric Shovels and Dragline Excavators

II. How to Maintain Motor Bearings

This is the second series of articles on the "Maintenance and Upkeep of Motors on Electric Excavating Machinery." The first article appeared in our September issue under the following subjects: "Insufficient Oil," "Dirty Oil," "Failure of Oil Rings to Revolve," "Compression Grease Bearings," "Poor Alignment of Gears," and "Bent Shafts."

Worn Bearings

The air gap of the motor should be checked at regular intervals with feeler gauges to see if excessive bearing wear has taken place. If the worn bearings have allowed the rotor to become displaced from its true mechanical center, the bearing should be replaced as soon as possible, as there is considerable danger of the rotor rubbing against the stator, resulting in the destruction of the insulation of the coils if this action is allowed to continue. As the air gap of an induction motor is much less than that of the average direct current motor, it is necessary to watch the bearings of the former much more carefully.

It will be found advisable to keep on hand spare bearings of each size in use in order to avoid a shut-down due to worn-out bearings. Where a large number of motors, or the frequency with which worn bearings must be replaced, render it advisable to rebabbitt the old bearing shells, the following instructions may be used to advantage:

Rebabbitting of Bearing Shells

The bearing shell should be removed from the housing and the old babbitt lining removed by heating. The shell should then be cleaned of all oil, dirt, etc., either by dipping in a solution of caustic potash or by burning, after which the shell should be gone over with sand paper or a rough file to remove the scale or oxide.

In babbitting iron or steel shells, the mandrel should be preheated to a temperature of approximately 150°C., and the bearing shell to 100°C. If the shell is heated too hot, the length of time for cooling may be so long that the heavier metals in the babbitt will have time to settle to the bottom end of the bearing, in which case the metal in one end of the bearing will be soft and in the other end brittle, while if the shell is too cold, it will cool the babbitt too suddenly and cause it to shrink away from the shell.

The babbitt should be melted in an iron pot or kettle and maintained at a temperature of from 450° to 470°C. During heating, the babbitt metal should be kept covered with charcoal or graphite to prevent oxidation.

The babbitt should be poured from a ladle in a steady stream directly down along the mandrel to avoid splashing or pocketing of air. If the babbitt is not poured carefully, blow holes will result and a defective bearing lining will be obtained. After pouring, the bearing should be allowed to cool for a few minutes after which the mandrel may be removed. After cooling, the bearing may then be machined to the proper dimension.

In machining, care should be taken to properly center the bearing shell, as a very small error may result in a ruined bearing. In reaming, or boring the babbitted shell, the workman should in all cases work to the minimum bore limit as given in the accompanying table.

After the bearing has been machined to the proper dimension, oil grooves should be cut in the upper half of the babbitt lining. These grooves may be cut with an air chisel and the edges scraped or rounded off to give a smooth surface.

Bore Finishes for Horizontal Bearings Oil Ring Lubrication

Nominal Shaft Diameter	Bore Limits − + on bore.	Permissible Variation in size of shaft and bore.	
		Min.	Max.
Up to 5/8″ incl.	.0015″	.001	.002
Above 5/8″ to 1″ incl.	.003″	.002	.004
Above 1″ to 1½″ incl.	.004″	.003	.005
Above 1½″ to 2½″ incl.	.006″	.004	.008
Above 2½″ to 4″ incl.	.008″	.005	.011
Above 4½″ to 5″ incl.	.010″	.007	.013
Above 5″ to 5½″ incl.	.011″	.008	.014
Above 5½″ to 6″ incl.	.012″	.009	.015
Above 6″ to 7″ incl.	.014″	.011	.017

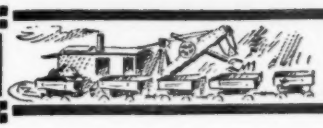
Grease Bearings

Nominal Shaft Diameter		Bore Limits + on bore before bearing is assembled.	
From	Not Including	Max.	Min.
	1″	.002″	.0015″
1″	1½	.0025	.002
1½	1¾	.0035	.003
1¾	2¼	.007	.005
2¼	3	.008	.006
3	3¼	.010	.008
3¼	3¾	.012	.010
3¾	4¼	.014	.012
4¼	6	.016	.014

The subject of "Maintenance of Motor Bearings on Electric Shovels and Draglines" will be continued in a subsequent issue under the heading: "How to Rewind Induction Motors."

Cop—Hey, where you going? Don't you know this is a one-way street?

Abe (in new car)—Vell, I'm only going one vay, aint it?—Pitt Panther.



DEVICES YOU OUGHT · TO KNOW ABOUT ·

The Road-Razer — and Its Work

Perhaps the highest tribute we can pay to a man or to a machine is to say that he or it does a big job well. To the One-Man Road-Razer shown here and put out by the Avery Company, we can truthfully pay the ultra-high compliment—it does its job well.

The work of the Road-Razer is a big work, and is easier said than done. It is to shave rough roads smooth, to raise ruts and holes, to level bumps and humps, to make our dirt roads and streets twelve-month-in-the-year boulevards.

Though the work of the Razer is a big work, it does it, and public officials see in it the solution to the dirt roads problem; the people—the tax-payers see the opportunity to enjoy good dirt roads and streets the year round at a low cost, for the Road-Razer will do a maximum of work at a minimum of expense.

In his inaugural address President Harding voiced the consensus of opinion of the nation's road boosters, when he said: "I know of nothing more shocking than the millions of public funds wasted in improved highways, wasted because there is no policy of maintenance."

But has it been really possible to do better with the limited means we have had? As one prominent road official said, "You know as well as I that the road-dragging proposition is a farce. We have always needed a machine with a blade to cut off the bumps and humps and fill in the low places."

The great need has been for a one-man self-contained unit, with a blade that could be adjusted to road curvature and to depth of cut. The advent of such a machine has, even though looked for, created a nation-wide sensation.

Ease of Handling

The Road-Razer is built for maintaining country roads, city streets, and road patrol work in general. It is built to shave rough roads smooth. To do this work it must be able to swing in and out of corners and turn around in a short space. This outfit turns around instantly, no backing or tedious work of moving a few inches at a time. The blade is swung right underneath the frame and naturally swings with the outfit. The fact that this machine turns in its tracks, and instantly, is of unusual advantage in road maintenance work.

When the end of a round is reached, all the operator has to do is to release the steering wheel, which allows the front wheel to act as a caster. At the same time, he takes hold of the two levers operating the differential brakes on each rear wheel. By locking either rear wheel it remains stationary and acts like a pivot while the other

Equipped with Scarifier Attachment for Use on Gravel, Crushed Roc Roads, Oiled Streets, Etc.

revolves around it until the machine has turned completely around. Then the levers are released and the machine is guided as before with the steering wheel. It turns around in its own length, and either way, depending upon which wheel the power is applied.

Construction

The blade consists of three sections: two 5-ft. lengths and one 2½-ft. length. These sections form one continuous blade, the sections overlapping and being hinged at the joints so that adjustments relative to the crown of the road and the gutters may be taken care of. All adjustments are made by levers which control the blades through pressure and cushion springs and the levers are easily handled by the operator from the seat. The width of cut is 9-ft. 6-in. The scraper is 13 inches wide and ¼-inch thick. The cutting edge is 5 inches wide and is detachable.

The blade is placed diagonally under the machine in such a way that a 10-inch clearance is maintained ahead of the right drive wheel and behind the left drive wheel and the blade projects equally on each side of the machine. It passes exactly through the intersection of the middle of the rear axle and the center line of the machine, making a well-balanced job with easy control.

Asset to Community

Long before the Road-Razer became much more than an idea, its work was cut out for it—to keep the dirt roads leveled off and by so doing to not only make better roads, but to make it possible to use them nearly all year around. The cold weather of winter and the spring thaw, or rain, will not damage a well-kept road as much as it will a rutty, rough one.

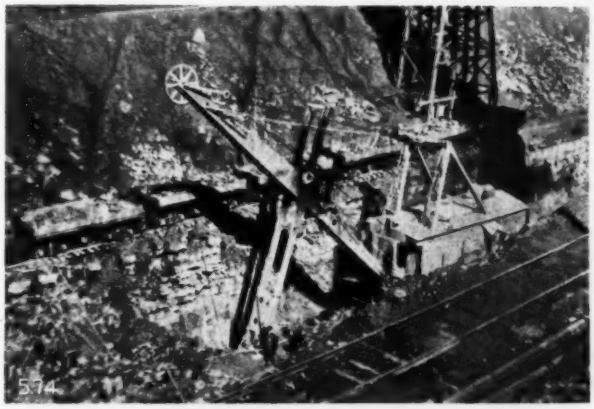
Good roads are the greatest single factors in

Bucyrus 14-B Revolving Shovel, Owned by the Home Department of the Japanese Government, Working at Nodamachi, Japan.

The Head Tower of the 5-Yd. Bu
the Mississippi River C

A Bucyrus 25-B and Marion Model 28 on Palmer
The job consists of 7 miles of road betwe
engineer on the Bucyrus,

cavator No. 905 at Work for
ckney, Arkansas.



Digging in with a Bucyrus 225-B revolving shovel. A mighty unit in the campaign for low construction costs on the Queenston-Chippewa Power Canal, Niagara Falls, Canada.

highway job in Del Norte County, California.
ty and Requa. Vick Pierce is shovel
y is piloting the Marion.

securing and maintaining "community prosperity." Last year the sum of $300,000,000 was lost by farmers in marketing (or being unable to market) their products over bad roads. Roads that are impassable during part of the year cost farmers in every community thousands of dollars a week.

When one stops to think that in every township laid out in sections there are 72 miles of roads, it is easy to imagine the mileage of roads in this country. Of these hundreds of thousands of miles of roads and streets, comparatively few miles are paved, and a noted authority on road-building prophesies that not more than 8 per cent of all the roads in this country will be paved roads by 1926.

A "Once-Over" with the Road-Razer Shaves Off All High Places, Fills in Low Spots and Leaves a Smooth Surface

It would be excellent if we could have all hard roads—brick, concrete or macadam roads, which are good all-year roads. We should have more of them. But it is impracticable for some time to come to pave every country road. While it is just as important to have good laterals leading to the main roads as it is to have hard main roads themselves. So we must do the best we can and properly maintain our dirt roads and streets.

By the use of such an outfit as this machine country roads and city streets can be kept smooth and in the best possible condition at all times. It is ideal where the road patrol system of continuous maintenance is in operation—a system which because of its merit is rapidly coming into use.

With this system and this machine one man can accomplish for a few dollars the same work that will cost hundreds later. If the machine is used on the roads after each rain, as it should be when the roads are in proper condition for maintaining, an immense saving can be effected each year in the cost of the road work. And not only that, the farmers and tax-payers will get the real worth of their money for they will have a "twelve-month-in-the-year" road at a minimum expense.

The "Road-Razer" will cover miles of country roads or city streets in a day. Cutting off bumps and ridges here, shaving off high places there, and filling in the low places everywhere, it leaves behind a smoothly finished road ready for traffic.

The use of this machine is real economy, because of its greater speed and because it replaces two or three teams of horses and two or three men. It is operated by one man; any man capable of driving an automobile, without previous experience, can operate it successfully. The operator sits at the rear of the tractor—the blade is in front and below him so that sitting in a comfortable, natural position he can see exactly what work is being done.

This machine may also be used for hauling loaded wagons, scrapers and other road machines used in highway maintenance. And it can be equipped with a belt pulley for operating a small rock crusher or other belt machine if desired.

For more detailed information regarding the Road-Razer, write the Avery Company, Peoria, Ill., using one of the blank post cards inclosed in this magazine.

Fellowships Awarded in Highway Engineering and Highway Transport

The University of Michigan has announced that the following Fellowships will be awarded by the Board of Regents not later than November 1, 1921.

The Roy D. Chapin Fellowship in Highway Transport, which is offered to provide for the investigation of an approved subject relative to Highway Transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.

General Conditions of the Fellowships are as follows: Each Fellowship pays the sum of $250 with an allowance of $50 for expenses. The holders of these Fellowships do not have to pay tuition fees. A Fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of Master of Science or Master of Science in Engineering. He must be in residence for one of the following periods: First Semester (October to February); Winter Period (December to March); Second Semester (February to June). An application for a Fellowship must include a concise statement of the candidate's educational training and engineering experience, and three references. Applications and requests for information pertaining to the twenty-five advanced courses in highway engineering and highway transport offered by the Graduate School should be sent to Arthur H. Blanchard, University of Michigan, Ann Arbor, Mich.

An Irishman was handling dynamite in a quarry. He let a stick drop and the whole box went up, taking Mike with it. The quarry boss came around later and said to another Irishman:

"Where is Mike?"

"He's gone," replied Pat.

"When will he be back?" asked the boss.

"Well," replied Pat, "if he comes back as fast as he went, he'll be back yesterday."

SHOTS FROM THE · FIRING LINE ·

Alabama

The State Highway Dept., Montgomery, plans constructing a 14 2/3 mi. gravel road known as Leighton pike and extending from Tuscumbia to Town Creek bridge; Colbert County. This road is to cost $148,272.

Canal Zone

Official reports for the month of July advise that the movement of material over Cucaracha slide continued at a slower rate during the month. Bucyrus dipper dredges moved 44,150 cubic yards of material from this slide in ten days' time.

Since February 22, 1920, 2,737,050 cubic yards have been removed from this slide.

On July 14 a general movement occurred in an old slide, a quarter mile of Culebra Slide in Gaillard Cut, carrying 185,000 cubic yards into the Canal. Two Bucyrus dipper dredges worked the remainder of the month removing 149,450 yards. No serious inconvenience to canal traffic was occasioned.

The three Bucyrus 15-yard dipper dredges moved 221,600 yards during the month of which 161,900 was classified as rock.

Canada

Eastern News

R. ST. JOHN, MONTREAL

There is nothing very much doing in the construction line in this vicinity. Unemployment is very bad and much improvement is not looked for before spring.

M. A. J. McDougal of McDougal Brothers, Minto, N. B., was in Montreal for a few days last month.

Mr. Louis Ott of L. A. Ott & Company has about completed his subdivision work for the town of Mount Royal and is now looking around for more work for his plant.

Mr. John Kennedy of Kennedy & McDonald, Westfield, N. B., was in Montreal last month for a few days.

Mr. Andrew Wheaton was also there for a few days.

Mr. Harry McLean took a little holiday near Bathurst, N. B. fishing and shooting.

J. P. Porter, Standifer & Porter Brothers, have been awarded the contract for the completion of sections one and two of the Welland Ship Canal. Tenders are now being called for the completion of section three.

Western News—Vancouver and Vicinity

The extension of the China Creek sewer is planned by Vancouver's City Engineer, F. L. Fellowes.

The Marine Drive bridge across the Capilano River at Vancouver will be rebuilt. Estimated cost, $31,000. Clerk, James Ollason.

A by-law will be submitted to the ratepayers to authorize the raising of $200,000 for constructing, grading and macadamizing of streets and lanes, Vancouver.

Fire at Kelowna destroyed the factories of the Dominion Canners Co., the Western Canners and the Shepherd Fruit Products, Ltd. Total estimated loss, $150,000.

The contract for the fabricated steel work for the new drydock at Esquimalt has been let by the Pacific Construction Co., to E. G. Prior & Co., of Victoria, B. C. The contract comprises nearly 70,000 fabricated steel parts. The rolling of the materials will be done by the Vancouver Rolling Mills and the fabrication by Yarrows Ltd. Both of these firms are sub-contractors.

Contract has been awarded to P. W. Graham, of Moose Jaw, Sask., for the erection of a railway terminal for the Canadian National Railways at Prince George.

Contract has been awarded to P. W. Graham, of Moose Jaw, Sask., for the erection of a railway terminal for the Canadian National Railways, at Prince Rupert.

Regulations which come into effect on December 31st, 1921, provide that all goods imported into Canada shall be marked in an indelible and permanent manner with the name of the country of origin. Full particulars can be had by applying to the Commissioner of Customs, Ottawa, for memorandum No. 9.

"Billy" MacDougall who was well known to all contractors in Western Canada, having been associated with J. D. McArthur for many years, died suddenly at Melville on August 25th. The body was interred in Elmwood cemetery in the presence of a very large number of mourners. "Billy" was extremely popular in athletic circles from which he will be greatly missed. At the time of his demise he was engaged on Messrs. Tomlinson & Fleming's reservoir work at Melville.

Chicago and Vicinity

Construction of new ditch and cleaning out old ditch in Drainage District No. 12 and 14, Scott County, requiring the excavation of over 1,000,000 yds. was awarded on August 25 to W. E. Callahan Construction Co., Dallas, Texas. Other bidders were Foley Bros. and D. A. Foley Co., St. Paul, Warner Const. Co., Benton, Mo.; Munn & Lunenschloss, Cape Girardeau, Mo.

Contract for the construction of new channel for Platte River Drainage District No. 2 of Ringgold County requiring excavation of 273,000 cu. yds. was awarded on August 22nd to O. P. Herrick, Des Moines, Ia.

Mr. Leash of the Egyptian Monaculite Co., St. Louis, was a caller in Chicago this past month.

Mr. Reeve Hutchinson of Pine Bluff, Arkansas, paid Chicago a visit recently.

A. J. Callahan, who for a number of years has been connected with the firm of W. E. Callahan Const. Co. in the capacity of general manager, has recently taken a subcontract from this company in Pike County, Mo. He is operating on this contract a Bucyrus Class-9½ Gasoline Caterpillar dragline.

W. E. Callahan of Dallas, Texas, stopped off for a few days in Chicago.

Mr. C. E. Miller, engineer for the Belzoni Drainage District, Belzoni, Miss., spent his vacation in Chicago.

Mr. O. C. Kulicka, engineer in charge of maintenance of Riverside and Boguephalia Drainage District 5, Greenville, Washington Co., Miss., called in Chicago last month.

Mr. B. G. Stining of the Missouri Iron & Steel Corp., St. Louis, called a short time ago.

No contract was awarded on August 31st for the construction of ditches and levees in the Captain Pond Drainage and Levee District, which involves the excavation of 1,438,000 cu. yds. The following contractors submitted bids: Yale & Reagan, Chicago, Ill.; W. E. Callahan Const. Co., Dallas, Texas; Fred C. Morgan, Indianapolis; McWilliams Dredging Co., Chicago; Charles De Frees, Worthington, Ind.

Florida

Moore Haven D. D. Assn., c/o E. Keen, engr., plans to construct 500 mi. 4 x 4 ft. ditches to drain 66,000 acres of land.

Illinois

Chicago and Milwaukee are to have a new suburb located half way between the two cities on the shore of Lake Michigan. A 100-foot mile long boulevard to be called Chiwaukee terrace, will connect Sheridan road with the lake and a large resort hotel is planned at the lake end of the terrace. J. H. Penny of Evanston, member of the syndicate, is in charge of the project.

Inter-Mountain News

BY H. N. STEINBARGER, DENVER

The Colorado State Highway Department contemplates taking over 15 miles of the road bed of the Colorado, Midland Railroad between Buena Vista and Bath Hill,

UMI

Colo. An agreement has been reached to turn over this part of the old road bed during a recent conference with Major L. D. Blauvelt, State Highway Engineer and A. E. Carlton, Receiver for the Colorado, Midland Railroad. By using this old road bed the State can save many thousands of dollars as this section of the Transcontinental Highway in Colorado has been a source of great expense to the State. Plans were recently submitted to the Government for Federal Aid and if granted it will mean only 50% of the cost will have to be borne by the State and Counties. This road forms an entrance to the South Park Country, passing through one of the most picturesque canyons in the State.

It was recently reported that the Union Pacific Railroad is building the only new road in the United States, in other words, the only other Railroad work being done in this Country is betterment work. The road referred to is a new line from Haig, Nebraska, into the Goshen Hole Country in Wyoming. Most of the grading is now completed excepting possibly the one steam shovel job which was not started until rails had been laid the distance of about 20 miles. By holding up the steam shovel work until the last, they saved the heavy expense of moving the outfit cross country.

An announcement somewhat delayed, but of great interest to the Denver section, was the recent establishment of Denver Local No. 91 of the International Brotherhood of Steam Shovel and Dredge Operators, organized June 28, 1921. Thomas Bryson, Representative of District No. 4, with headquarters in the Hanford Bldg., San Francisco, came to Denver and perfected the Organization. The charter membership of Denver Local was 14, and in two months it had increased to something over 20 members, District No. 4 comprises six States—California, Nevada, Utah, Arizona, New Mexico and Colorado. To have Local No. 91 in Denver is a great thing for this intermountain territory as it means that the livest and most efficient bunch of workers in this country make their headquarters here and naturally a great many of them their homes. Jim Davies, 1711 Market St. is Secretary of Local No. 91 and this certainly spells success for the Denver Local as he is one hundred percent on the job all the time and whatever he does is done right.

Who do you think came to Town? George Kennedy, that old timer who knows more about a steam shovel than the man who builds them. He has been away from his old stamping ground back in Pennsylvania and other points for eight or nine years and it sure was good for one's eyes to see his smiling countenance framed in the doorway. He has re-established his home in Denver and we are hoping that no "super" attractive offers will come from other sections to call him away from this village.

After being buried in California for about four years, "old-timer" John J. Crook, formerly of Young & Crook, has come back to his first love, Colorado, and of course Denver, the logical headquarters for big railroad contractors. John has established an office at 213 Colorado Building, Denver, and is open for business. As there is not much railroad work in this territory or anywhere else for that matter, he is, at the present, confining his efforts to highway construction of which there is considerable under way and planned for the intermountain section. He left his old partner "the beautiful blond" John Young out in California where he has entered the automobile business. In other words, he believes in tearing up the roads in a high powered Packard rather than building roads and believe us, Johnny Young can hit the high spots. "Mister" Crook is looking for a job for his 70-C Bucyrus outfit. Who has one for him? Let us all speak at once and make him happy.

The New Rocky Mountain Highway from Denver to Yellowstone National Park is "some road." It runs in almost a bee-line straight into the Southern Gateway of the Park. The first official trip over the new Highway was made by Colorado and Wyoming Officials, Representatives of the Federal Government and Members of Civic Associations. The route covered was Denver to Longmont, Loveland and Ft. Collins, Colo., by way of Laramie, Rawlins, Lander, Dubois and Moran, Wyoming into the Park. The opening of this Highway means that a loop trip can be made from Denver to the Yellowstone over fine roads, without passing over any of the same country twice, going by way of the Rocky Mountain Highway, skirting the majority of the great and highest peaks, and returning through the Eastern Gateway by way of Cody, over the Yellowstone Highway to Casper, Douglas and Cheyenne and other important towns in Wyoming, thence to Greeley and Denver. In no part of the United States will be found a better or finer trip for the Tourist. He will pass through or within a few miles of six National Forests, crossing many Mountain Streams filled with trout, plenty of shady camping ground and through several Indian Reservations.

Kansas

E. F. Keiney is running a Bucyrus 225-B for the Reliance Coal Co. at Pittsburgh. His address is R. F. D. No. 6, Pittsburgh.

The Wichita, Northwestern Railway Company contemplates the construction of a railroad between Vaughn and Larosse.

Kentucky

The Louisville & Nashville R. R., has completed a preliminary survey for a proposed extension of railroad from Beattyville, Lee County, across sections of Lee County, through Clar and Bell Counties of Loyal, Harlan County.

Massachusetts

The following contractors have recently been awarded state highway contracts at points mentioned: Hoyt Construction Co. of Holyoke, at Monterey; C. Bianchi & Co. of Framingham, at Middlefield, Peru; Hauscom Construction Co. of Boston, at Lynnfield, Cauedy Construction Co. of East Taunton, at Wrentham, and Periui & Sons of Ashland, at Ashland.

Michigan

A plan for the construction of an eight-mile subsidiary line has been submitted to the Pere Marquette Railway Company by the City of Flint.

Missouri

The State Highway Dept., Jefferson City, plans to build 3.2 mi. state road from Columbia westward, State Aid Project 20.77, Boone Co., involving 30,617 cu. yd. earth and 20 cu. yd. rock excav., 2,709 cu. yd. borrow, 71.9 cu. yd. Class B and 85.4 cu. yd. Class C concrete masonry, $25,000; 5.57 mi. state road from Hartville southwestward, State Aid Project 20.73, Wright Co., 23.00 cu. yd. earth and 2,267 cu. yd. rock excav., 1,059 cu. yd. borrow, 235.8 cu. yd. Class B and 6 cu. yd. Class C concrete, etc., $25,000; 1.53 mi. state road from Paris southward, State Aid Project 20.85, Monroe Co., 9,737 cu. yd. earth excav., 52 cu. yd. Class B and 3.8 cu. yd. Class C concrete masonry, $7,233; 1.82 mi. state road from Paris northwestward, State Aid Project 20.47, Monroa Co., 16,144 cu. yd. earth and 216 cu. yd. rock excav., 130.4 cu. yd. Class B and 1.2 cu. yd. Class C concrete masonry, etc., $14,413; 2.38 mi. state road from Paris westward, State Aid Project 20.86, Monroe Co., 15,260 cu. yd. earth and 10 cu. yd. rock excav., 2,702 cu. yd. borrow, 170.3 cu. yd. Class B and 7.4 cu. yd. Class C concrete masonry, etc., $15,357; 2.47 mi. state road from Luray westward, State Aid Project 20.00, Clark Co., 27,393 cu. yd. earth and 10 cu. yd. rock excav., 1,550 cu. yd. borrow, 136.2 cu. yd. Class B and 5.6 cu. yd. Class C concrete masonry, etc., $19,443; 2.25 mi. state road from Linn Creek northeast and southwest, State Aid Project 20.81, Camden Co., 17,489 cu. yd. earth and 2,458 cu. yd. rock excav., 152 cu. yd. borrow, 130.2 cu. yd. Class B and 1.6 cu. yd. Class C concrete masonry, etc., $28,486. A. Graham, state highway engr.

The State Highway Dept., will also construct a 5 mi. road between Fair Play and Bolivar, Polk County; cost

$30,023; and a 4 mi. Springfield-Jefferson City road in Dallas County; cost $17,644; will invite bids; H. P. Moberly, Div. Engr., Jefferson City.

Nevada

According to Frank Mahoney of Mahoney Bros., San Francisco, an 18-mile transferring plant will be constructed in connection with the Tonopah and Goldfield Railroad transferring at Millers.

New Mexico

In connection with bids opened August 30 covering Federal and Forest Aid road projects complete with structures, the following were low bidders and contracts awarded as follows:

Forest Aid Project, Navajo Canyon, Rio Arriba Co. Length of project 4.394 miles, located between Canjilon and Tierra Amarilla to French and Harvey, Santa Fe, New Mexico, $24,123.89.

Federal Aid Project No. 1-D, Colfax County. Length of project 11.592 miles, located between Colfax and Cimarron, to Atlas Construction Company, La Veta, Colorado and A. P. Atchinson, Raton, N. M., $35,866.30.

Federal Aid Project No. 40, Otero County. Length of project 6.801 miles, located between Mescalero and Tularosa, to J. V. Stryker Construction Company, Denver, Colorado, $45,776.21.

Federal Aid Project No. 48, Chaves County. Length of project 16.361 miles, located between Roswell and Dexter, to Duvall, Johnston and Sappington, Roswell, N. M., $61,321.15.

Federal Aid Project No. 54, Hidalgo County. Length of project 32.604 miles, located between Steins and Rodeo, to O. C. McElrath Construction Company, Mesa, Arizona, $83,823.01.

Federal Aid Project No. 55, Grant County. Length of project 4.343 miles, located between Hurley and Bayard Station, to J. V. Stryker Construction Company, Denver, Colorado, $27,921.35.

Federal Aid Project No. 60-B, San Miguel County. Length of project 20.871 miles, located between Tecolote and Fulton, to Peterson, Shirley and Gunther, Omaha, Nebraska, $121,062.04.

Federal Aid Project No. 67, Taos County. Length of project 10.057 miles, located between Taos and Taos Junction, to Morrison, Sheetz and Morrison, Colorado Springs, Colorado, $57,669.37.

All of the above amounts exclusive of 10% for Engineering and contingencies.

The following contractors submitted bids:

Fred Croxton, Guyman, Oklahoma.
French & Harvey, Santa Fe, N. M.
Dan La Roe, Silver City, N. M.
Bibbs & Hughes, Waco, Texas.
C. E. Mauldin, Clovis, N. M.
Mitchell & Kirk, Tularosa, N. M.
J. H. Bowman, Jr., Douglas, Ariz.
A. P. Atchinson, Raten, N. M.
W. A. Wogan, Denver, Colorado.
Atlas Construction Co., LaVeta, Colo.
Robert MacKay, Tucson, Arizona.
Allhands & Davis, Joplin, Mo.
McKnight & Howell, Amarillo, Texas.
Kroeger & Hayner, Las Cruces, N. M.
Cimarron Highway Co., Cimarron, N. M.
Mishou, Clark & Teyssier, Aztec, N. M.
T. M. Bookout & Sons, Tularosa, N. M.
Stephens, Hastie & Anderson, Artesia, New Mexico.
J. V. Stryker Construction Co., Denver, Colorado.
Cunningham & Daniels, Alamogordo, N. M.
O. C. McElrath Construction Co., Mesa, Arizona.
Lee Moor Contracting Company, El Paso, Texas.
New Mexico Construction Co., Albuquerque, N. M.
Cotey & Black, Clifton, Arizona.
Peterson, Shirley & Gunther, Omaha, Nebraska.
Duvall, Johnston & Sappington, Roswell, N. M.
Odell Bros. Construction Co., Raton, N. M.
Morrison, Sheetz & Morrison, Colorado Springs, Colorado.

New York District

Fred Schneider, Inc., of the Bronx have practically completed their big contract at 161st Street, New York City, and are now using their 65-ton Bucyrus in a heavy rock excavation at 167th Street and Grand Concourse.

Flemming, O'Brien & McIntergart of 401 W. 59th Street, New York City, are making quick work of their road job at Mt. Cisco.

W. J. Fitzpatrick of New York City is going ahead rapidly with the paving and elevating of West Street. He is using a Keystone excavator to rip out the old cobblestones, and is making very good progress.

Wm. Porter & Company are rapidly completing their job at Moriches, Long Island.

Arthur A. Johnson of Long Island City is at present constructing a six-mile road near Parsippany, New Jersey. Concreting started some time ago. Heavy excavating was encountered on this job and two shovels and one Keystone excavator were used. Arthur Johnson also has a number of good jobs in and around New York City.

The Hudson Contracting Company of Jersey City has been awarded a contract for the construction of 44,763 yards of reinforced portland cement road 8" thick and other work incidental to road construction. The job is to be part of the Jersey State Highway and extends from Marlatts Corner to Port Golden, N. J.

Michael Staub of Woodbury, N. J., has been awarded a contract to build 47,146 square yards reinforced concrete roadway extending from Woodstown to Salem, New Jersey, at a total amount of $166,637.44.

The O. G. Julian Engineering Construction Company has been awarded contract for the construction of 36,694 square yards of portland cement foundation and 34,694 square yards of Warrenite bitulithic surface pavement between, Madison and Chatham, New Jersey.

Contract for the construction of bridge No. 57, New Jersey State Highway route No. 4, has been awarded to L. J. Seiling of Redbank, N. J.

Six bridges on the State Highway route No. 12 will be built by the Dover Boiler Works of Dover, N. J.

F. W. Schwiers, Jr., of 90 West Street, New York City, has been awarded a contract amounting to $69,900 for repairs to the Matawan Creek bridge on State Highway route No. 4.

C. H. Winans of 207 Broad Street, Elizabeth, New Jersey, recently received a contract for the construction of 35,225 yards of gravel road between Hackettstown and Drakestown, N. J. This job includes 37,719 cubic yards of excavation.

The Tri-State Construction Company has been awarded another contract for road work in the State of New Jersey comprising 28,171 yards of excavation and 80,031 yards of gravel surfacing.

Lehigh & Wilkesbarre Coal Company has purchased a 30-B Bucyrus for coal stripping near Wilkesbarre, Pa.

The Awixa 30-B Bucyrus at work on their road job near Nicholson, Pa., has been giving excellent service, and the job is progressing very nicely.

Handy Brothers of Field Place have a number of cellar excavating jobs throughout the Bronx, and are using their two 18-B Bucyrus shovels to good advantage.

The Pathfinder Construction Co., Fulton, N. Y., have completed the concrete laying on the State Highway from Baldwinsville to Plainville, N. Y. They are cleaning up the shoulders and it will be only a few weeks when the road is turned over to the state. As it is traffic is now open. This road gives practically a new state route from Syracuse to Rochester and cuts down the distance considerably. It joins the Million Dollar Highway that runs from Rochester to Watertown, N. Y., skirting the shores of Lake Ontario.

The City of Syracuse is preparing a Bond Issue to

come out shortly, part the proceeds of which will be used to provide another supply line for city water from Skaneateles Lake.

The State Highway Dept. of New York has been averaging about two lettings per month on road work. About one half the work let is for repairs or reconstruction of old highway, some of the first to be laid in the state. Many mistakes were made in some of the earlier roads. Most of them were too narrow. Many with a concrete base did not have a heavy enough base and the concrete was laid continuously, no space for expansion or creeping being left. The result was these roads upheaved badly from frost. They also cracked badly and were soon worn full of holes. Some of these old concrete base roads have been entirely resurfaced. They are first cleaned, given a coat of tar and three to four inches of waterbound macadam laid on top. This is rolled down and an asphalt dressing put on top. This results in a very fine smooth road. The one disadvantage is that when wet the road is apt to be slippery.

Northern States Notes

Since the last issue, there has been a lull in the letting of highway construction contracts throughout the Northern states. This of course is to be expected at this time of the year. It is to be hoped, however, that the different state highway commissioners will follow the advice of many, that the letting of road construction contracts be carried out in the Fall of this and succeeding years instead of in the Spring following. In a recent issue of Engineering and Contracting the benefits claimed for the Fall letting of road contracts are given as follows:

"1. Approximately two months more time for actual construction, or an increase of 25 to 33 per cent in the use of equipment and return on the capital invested in it.

2. The transfer of certain items of equipment direct from the end of the last job in the fall to the site of the new job in the spring, thus saving cost of transportation to and from a storage yard, and in some instances saving rental of storage space.

3. The assembling of equipment in advance, thus increasing the period of maximum operations to the utmost practical limit.

4. Sometimes the performance of heavy grading out of season.

5. The cheaper purchase of materials in cases where advance knowledge enables the manufacturer to make and to sell his product cheaper.

6. Greater assurance that materials will be available when needed.

7. Avoidance of late summer and fall congestion on the railroads, with the attendant risk of delays in material delivery.

8. The opportunity for maintaining a larger part of the best members of a working organization throughout the year. The lengthened construction season, the various features of preliminary work, and the possibilities of doing more definite preparatory work on equipment all help toward this end.

9. The ability to secure and to hold better men through the prospect of continuous employment.

10. The improvement in efficiency through the reduction of "peaks," the maintenance of a steadier rate of work, and the opportunity for better planning."

Allied Contractors, Inc., Omaha, Nebr., received award for the paving of various streets, construction of retaining wall, and the construction of curb and gutters in the City of Hot Springs, South Dakota.

Western Construction Co., Helena, Montana, were low bidders on 5.8-miles of road construction on the Yellowstone Trail from Pompey's Pillar to Bull Mountain, Montana.

Glasco, Marion, Clements & Schottenbauer, Redwood Falls, Minn., were awarded 10.3 miles of gravel surfacing of State Road No. 3 between the City of Fairmont and the northern line of Martin County, Minn.

The Northern Minnesota Drainage Company of Litchfield, Minn., were awarded 26.9 miles of ditch in Aitkin County, comprising 375,354.2 cu. yds. of excavation.

Humphrey, McCullough & Moe, Deerwood, Minn., have been awarded contract for the construction of Job No. 2101, State Road No. 3 in Aitkin County, Minn., comprising 47,000 cu. yds. of excavation.

The Pastoret Construction Co., of Duluth, Minn., and E. T. Webster, St. Paul, Minn., were the two lowest bidders for the construction of sanitary and storm sewers recently opened for bids in St. Cloud, Minn. The bids of these two concerns were held over for decision.

N. C. Christenson, Mankato, Minn., received contract for graveling Trunk Line Road between Mankato and Mapleton, Minn.

Albert Telford, Marshall, Minn., has been awarded open work of County Ditch No. 54 near Redwood Falls, Minn. This work comprises 210,000 cu. yds. of excavation, and the price quoted was 13c per yard.

The open work of Judicial Ditch No. 85 near Fairmont, Minn., was awarded to O. H. Diercks, St. Paul, Minn.

Oklahoma

R. J. Barnes is craning a Bucyrus 70-C shovel for the Salina Gravel Co., at Salina. His address is Salina c/o Gravel Pit.

Oregon

Charley Doran, Engineer; John Miller, Pole Cat; and Frank Gregory, Smoker, are running a 45-ton Bucyrus shovel for the Utah Construction Co., near Portland, on a logging railroad job.

The Portland Railway, Light & Power Company plans a $30,000 project which calls for the reconstruction of track, roadway and paving on Third street.

Notes from the Pacific Coast

BY P. H. BIRCKHEAD, C. W. WHITNEY AND L. T. RUSSELL

Because of the necessity of diverting a portion of the flood waters of the Colorado River and strengthening the Ockerson levee, before the next flood season, General Manager Cronholm, of the Imperial Irrigation Dist., has asked for an appropriation of $275,000 for strengthening the levee and for the river diversion, and $2,844,000 for putting the river back into its old channel, thus removing permanently the annual flood menace.

Contract was awarded to Chadwick & Sykes for the construction of an addition to the Cambrian Reservoir for the San Jose Water Co., just outside of the town of Campbell. Work involving 25,000 to 30,000 cu. yds. of excavation and embankment is necessary.

Representatives of the Acme Mining & Dredging Co., which holds a number of placer claims on the Agua Fria were in Phoenix recently and reported they are preparing to place three large dredging machines on the river within a short time and will work a crew of about 300 men.

The company is an English concern, and during the past 10 years has made numerous attempts to profitably work the Agua Fria gravel but without success. It now has perfected dredges which have been proven able to work all low grade gravel in large quantities, and they have no doubt of the success of the present attempt.

The Northwestern Pacific Company has announced the appointment of G. H. Hicks as acting chief engineer of the road to replace J. W. Williams, who resigned to become chief engineer of the Western Pacific Company.

The Idaho Central Railroad Company has been authorized by the Interstate Commerce Commission to construct a railroad from Rogerson, Twin Falls Co., Idaho, to Wells, Elko Co., Nevada, a distance of ninety miles.

Awards for grading 1500 feet of the San Pablo Dam highway and graveling four miles of the Marsh Creek road have been awarded by the Board of Supervisors. The San Pablo contract was won by Erickson & Peterson on a bid of $5,450.00 and the Marsh Creek contract was secured by Guerin Bros. on a bid of $10,036.00. The

Supervisors have accepted as complete Divisions 10 and 22 constructed by Contractors Kopperud & Heafey. The acceptance of these two divisions marks the completion of the highway.

A sale of Arizona Copper Co's. property to Phelps-Dodge Corporation has been discussed recently. Officials of the last named company are reticent as to what progress has been made in the negotiations, but it is understood that Arizona Copper shareholders will receive Phelps-Dodge stock for their holdings if the deal goes through.

Arizona Copper Co., Ltd., owns about 4000 acres in the mineral belt of Clifton-Morenci district, Arizona. The company was incorporated in 1884 in Great Britain, and its stock is mainly held in Scotland. Its authorized capital consists of £755,000, of which £709,984 has been issued. The company has for years been a fair-sized copper producer. Output in 1917 reached 42,480,000 pounds, but was cut down to 32,000,000 in 1919, due to general curtailment.

The Taylor Childs Construction Company has been recently organized in Ogden, Utah. This firm comprises Wm. H. Taylor, John Childs, Mr. Ririe, and William Doyle. Most of these men are well known to the Contracting fraternity. Wm. H. Taylor has been connected with construction work for the past twenty years in the Intermountain country, and is well known to all contractors. They were recently successful bidders on a nice side walk job in Ogden as well as $150,000 worth of Ogden sewer system.

Strange & Vallandingham are hard at work on their contract at Helper, Utah, on State and Federal Aid Project work.

The Great Basin Power Company, of the Walker Bank Bldg., Salt Lake City, has been awarded a permit by the Federal Power Commission, Washington, D. C., for the construction and development of a power plant of 4000 H. P. on the West Fork of the Duchesne River. Mr. H. S. Straus, well-known hydraulic engineer, is in charge and is getting out plans for construction work which will probably be started during the next six or eight months.

E. J. Hunt has taken a contract for building six miles of the logging railroad for the Hutchinson Lumber Company at Oroville, California.

Wm. Mead reports good progress on his contract for the Western Pacific connections with the Hutchinson Lumber Company railroad.

R. J. Bianco of Vallejo has been awarded a $55,000.00 contract for highway work in Napa County.

F. Rolandi has a steam shovel outfit working for the Pacific Gas & Electric Company on the Pitt and Fall River project in Siskiyou Counties. The Company is building a railroad with day labor to reach the site of its operations.

P. L. Burr is building some more logging road for the Cotton-Pepper Lumber Company in the Northern part of the state.

Bates & Rogers Construction Company are building a 19-mile stretch of concrete paved highway in Merced Co., for the California Highway Commission. They have also secured two highway contracts from the state of Oregon.

It is reported that the Stone Canyon Railroad is to be rebuilt and placed in operation in order to handle coal from the Stone Canyon Mine which is to be reopened. This railroad is 23 miles long and connects with the Southern Pacific Coast Line near San Miguel.

Mrs. Ellen O'Brien has been awarded a contract for about $40,000.00 worth of county highway work on the Marsh Creek road in Contra Costa County. Mrs. O'Brien is continuing the contracting business founded by O'Brien Brothers, both of whom have died. This is the second contract Mrs. O'Brien has taken since she engaged in the business.

W. D. Harrison, engineer of the proposed Kasson Irrigation District, about 10 miles southeast of Tracy, Calif., has prepared plans for the work. Will irrigate 7000 acres.

Thos. Byrne of Sacramento has a contract for county highway work in Contra Costa Co. His work joins the job recently finished by F. Rolandi at Pacheco and extends to Concord.

Reclamation District No. 3047 at Colusa, Calif., took bids June 29th for drainage canals. This was all dredge work.

The Nevada Contracting Company was the lowest bidder for grading State Highway in Inyo County, Calif.

The Merced Irrigation District, Mr. W. D. Warner, Manager, has received authority to proceed with dam and reservoir construction at Exchequer, California.

F. C. McIntyre, of Stockton, has a new contract for grading 12 miles of highway in San Luis Obispo Co. The bid was $43,153.00.

W. U. Tobin, of Oakland, secured a contract for building sewers in Palo Alto.

Work on the Sespe power project was begun when President Frank Buren of the Sespe Light & Power Co., drove the first drill that inaugurated actual construction. This work consists of a dam across the Sespe river to provide water for a power plant. It is estimated that when operating at capacity this unit will develop 61,937,755 K. W. Hrs. per year.

Included in the expenditures for construction which the Western Pacific has just been authorized to make by the State Railroad Commission is $187,273.96 for the completion of the spur from Bidwell Station to Bidwell Bar, a distance of four miles.

C. C. Cottrell, State Highway Engineer of Nevada, has resigned to become manager of the good roads bureau of the California State Automobile Association.

W. J. Sparks and Martin Tesack are engineers, J. A. Mack and Steve Woznack are cranemen and Fred Bones and J. E. Brocklebank are firemen on a Model 20 for F. Rolandi on the Pitt River Power project at Fall River Mills, Calif.

The following are operating revolving shovels for Stone & Webster at Hullville, Calif.

G. T. White, Engineer	E. F. Tiebelt, Fireman
E. D. Brown, Engineer	C. C. Caldwell, Fireman
W. McDonald, Engineer	Harry Trainer, Fireman
T. G. Shannon, Engineer	John Taylor, Fireman
W. C. Shea, Engineer	Thomas Daly, Fireman

Work of widening the inner channels of Los Angeles harbor will be begun within ninety days. The first cut to be made will start at a point opposite the San Pedro city hall and will be 200-ft. wide and 2500-ft. long and 30-ft. deep. This cut will extend to the new east shore line of the widened channel reaching a point where the city of Los Angeles is to build a 3500-ft. wharf.

On completion of the first cut, another 200-ft. channel, 700-ft. long, will be cut at right angles to the new shore line at a base of which a new ferry landing will be constructed.

The dredging of the two channels will entail the removal of 1,500,000 cu. yds. of earth and will require a year's work according to estimates of the U. S. army engineers.

Although the Madera Irrigation District has only just put over the largest irrigation scheme in California, involving a bond issue of $28,000,000, plans are already out for a larger tri-country project along similar lines to exceed the Madera one by $2,000,000. The idea is to spend $30,000,000 in damming the Kings River at the junction of its middle and south forks, and to build a reservoir with a capacity of 500,000 acre feet and development possibilities of 188,000 horsepower.

G. F. Mason, formerly with the San Francisco office of Stone and Webster Company, who was engaged on the Caribou Power Plant for the Great Western Power Company, has recently been engaged by Wm. F. Ford, San Francisco, to handle for him as an engineering executive his several gravel and rock plants. Mr. Ford's Companies include the River Rock Gravel Co. operating in Tracy with a Class-14 electric dragline, the Niles Sand

Gravel and Rock Company at Niles, Calif., and the Riverbank Sand Co. at Riverbank, Calif. Mr. Mason is busily at work in bringing these plants up to a high state of efficiency.

James B. Girand, Phoenix, Arizona, has been granted a permit by the Federal Power Commission for the construction of a dam 250' high on the Colorado River, Mohave Co., Arizona. The dam will back water up Diamond Creek 25 miles and a power plant will be installed capable of producing 120,000 H. P.

Mr. M. S. Boss is engaged on quite a job of highway construction for the Highway Department, State of Washington, near Blanchard in the western part of the state, and is using one of his 18-B shovels and expects to be through probably in another month.

Mr. John Hampshire was recently awarded a nice job of highway building in southern Oregon and is getting his men and outfit on the work.

E. T. Johnson has a very good team outfit on his highway work near Sandy, Oregon.

The United Contracting Company are busy on their work of highway changing near Woodland, Washington. They are using about fifteen teams and one steam shovel on this work.

The logging industry has been very quiet throughout the north Pacific coast, but conditions are picking up and everyone looks for a material change for the better shortly after the first of the year.

The Port of Portland are planning to buy a booster unit to operate the connection for their dredging work on the lower river and expect to have plans and specifications prepared and ready for bidders within another ten days.

K. L. Goulter & Company have their 18-B Bucyrus shovel together with other equipment for work on their highway job near Wenatchee, Washington.

A. D. Kern has done a large amount of work during the present season in both gravelling, grading and paving, and is now engaged in a paving job near The Dalles, Oregon.

Rajotte, Winters & Co. have secured some additional highway work near Underwood, Washington, which has lasted them pretty well through the summer, though Mr. Paul Crooks advises they will be done within another month.

Southern States Notes

Wright & Nave of Charlotte, N. C., who have a contract with Central of Georgia Railway for an extension into new coal lands in Alabama are making good progress on the work. Steel is now being laid from McComb station.

Stanley and Suiger Construction Company have a contract for a portion of the Baukhead Highway in Talledega County, Alabama.

Thos. Worthington & Co. of Birmingham, Ala., have recently received two contracts for road work in Marshall County, Tennessee.

Brooks-Callaway Company of Atlanta, who have a contract for the construction of a part of Interstate Railroad in Virginia, report good progress being made.

Nichols Contracting Co. of Atlanta, Ga., were recently awarded a contract by the Central of Georgia Railway for a 40,000 cubic yard fill near Greenville, Ga.

H. B. Hoppendeitzel Company, of Macon, Ga., have a contract for about 12 miles of Dixie Highway from Waycross to Falkstone, Ga.

C. E. Teague and J. J. Butler of Augusta, Ga., have been awarded a contract for grading the road bed of the Georgia and Florida Railway between Hephzibah and Padgetts, Ga.

South Carolina

Citizens of Marion will vote on the proposition of paving, constructing a white way, drainage improvements and sewer extensions. Improvements call for a bond issue of $100,000.

Utah

The Utah Pacific R. R. Co., Provo, plans to build 76,334 mi. railroad, half of which is in mountains, from Juab to Red Creek coal fields. O. R. Knight, pres. H. S. Kerr, ch. engr.

Washington

A survey of the Wenatchie Valley District to determine the feasibility of a main line supply canal for irrigation purposes in Chelan and Grant Counties will be undertaken by the state department of conservation and development.

Foreign

China

The Kiangnan Dockyard, Shanghai, proposes to construct another dockyard on the grounds in front of the Naval Wireless Telegraph Station.

The Committee of National Roads, China, has decided to construct roads between Tientsin and Peking. The Peking-Tung Hsien roads will be constructed by the American Red Cross. The new national road from Tientsin to Tung Hsien is 61 miles long. The construction will require the service of 10,000 laborers. The plan at present is to use the famine relief fund for the construction of the road, the work being done by refugees.

Sweden

The Swedish Government has granted permission for the electrification of the Vadstena-Faagelsta Railway.

Cuba

O. H. Byles is running a Marion Model 60 for E. McManus on an extension of the United Fruit Co's. lines near Guaro Oriente, Cuba. They don't know what the 18th amendment means down there, according to Mr. Byles. Among other kinds of hootch they have a drink called "nigger rum" but we understand that this is good stuff to stay away from.

TRADE NOTES

Mr. H. F. Randall has succeeded Mr. E. F. Jones as manager of the G. H. Williams Company, Erie, Pennsylvania; Mr. E. F. Jones having resigned the first of July. Prior to the appointment Mr. Randall held the position of manager of the G. H. Williams New York Office.

FOR SALE

27-D Bucyrus Coal Loader thoroughly overhauled and in good condition. Address Seneca Coal Co., Box 391, Tulsa, Okla.

How It Strikes the Man on the Road

Each month we hear the same appeal,
"Send me some dope, some news that's real;
"The Excavating Engineer
"Must run along dispensing cheer
"To contractors and men alike
"No matter what the times look like."

But Oh, these days of frequent strike,
When all must wander down the pike,
From place to place and hoping seek
Some guy with job and order sheet.
"Come round next Spring," you hear them say,
"The gate for you, be on your way."

While work is scarce, hope still survives
To cheer us up as on we drive.
We wonder what the other men
Find in their travels you to pen.
Perhaps some day we, too, can say
Prosperity is on the way.

F. D. C.

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Don't handicap a good shovel with poor wagons.

USE WESTERNS

The Western Wagon will stand up under your big shovel — look at that one in the picture. At the same time your team will handle the load without overstraining. A frame of channel steel, wood-filled, and other features of design and construction give strength where strength is needed and saves your team.

Any contractor who has used them will tell you that Western Dump Wagons are ideal for shovel work.

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Western Wheeled Scraper Company

Founded 1877

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Aurora, Illinois

For convenience in making inquiry use postal inserted in this number.

The Trail Left by a Bucyrus Class-7 Dragline Through Florida Soil

Bucyrus Class-7 Gasoline Dragline at Work on One of the Ditches

Dragline Operation on Wills & Sons and McCarthy's Job on the Lake Worth Drainage District